

200314101-1

OCT 19 2007_{10/701,885}IN THE CLAIMS:

The status and content of each claim follows.

1. (previously presented) A method for solid free-form fabrication of a three-dimensional object, comprising:

 depositing a bulk amount of phase-change material in a defined region;

 selectively ink-jetting an ultraviolet initiator onto a predetermined area of said defined region, wherein said ultraviolet initiator defines a cross-sectional area of said three-dimensional object;

 applying ultrasonic energy to said phase-change material, wherein said ultrasonic energy is configured to facilitate a mixing of said phase-change material and said ultraviolet initiator; and

 exposing said ultraviolet initiator to an ultraviolet light to facilitate cross-linking of said phase-change material according to said predetermined area.
2. (previously presented) The method of claim 1, wherein the depositing a bulk amount of phase-change material step is performed after the selectively ink-jetting an ultraviolet initiator step for each layer of said three-dimensional object.
3. (original) The method of claim 1, wherein said depositing a bulk amount of phase-change material comprises depositing a pre-determined quantity of phase-change material with one of a print head operating in a low precision condition, a bulk spraying apparatus, a roller, a screen-printing device, or a doctor-blade device.

200314101-1

10/701,885

4. (original) The method of claim 1, wherein said selectively ink-jetting an ultraviolet initiator comprises controllably jetting said ultraviolet initiator to predetermined locations of said defined region.

5. (original) The method of claim 4, wherein said ultraviolet initiator is controllably jetted into a non-solid phase-change material.

6. (original) The method of claim 4, wherein said ultraviolet initiator is controllably jetted on top of a solidified phase-change material.

7. (original) The method of claim 6, wherein said ultraviolet light is configured to re-liquefy a surface layer of said phase-change material.

8. (original) The method of claim 7, wherein said ultraviolet light further comprises infrared radiation.

9. (original) The method of claim 4, wherein said ultraviolet initiator is controllably jetted by one of a thermally actuated inkjet dispenser, a mechanically actuated inkjet dispenser, an electrostatically actuated inkjet dispenser, a magnetically actuated inkjet dispenser, a piezoelectrically actuated inkjet dispenser, or a continuous inkjet dispenser.

10. (cancelled)

200314101-1

10/701,885

11. (previously presented) The method of claim 1, wherein said ultraviolet light is provided by one of a scanning unit or a flood exposer.

12. (previously presented) The method of claim 1, further comprising removing a non-cross-linked phase-change material from said cross-linked phase-change material.

13. (original) The method of claim 12, wherein said non-cross-linked phase-changed material is removed from said cross-linked phase-change material by the application of a thermal energy.

14. (cancelled)

15. (original) The method of claim 1, wherein said phase-change material comprises one of an unsaturated monomer containing at least one unsaturated functionality or an oligomer containing at least one unsaturated functionality.

16. (cancelled)

17. (previously presented) The method of claim 1, wherein said phase-change material comprises one of a stearyl acrylate, a cyclohexane dimethanol dimethacrylate, a cyclohexane dimethanol diacrylate, or a tris (2-hydroxy ethyl) isocyanurate triacrylate.

200314101-1

10/701,885

18. (original) The method of claim 15, wherein said phase-change material comprises a high melting unsaturated monomer or oligomer combined and plasticized with an unsaturated monomer or oligomer having a lower than ambient melting temperature.

19. (original) The method of claim 18, wherein said unsaturated monomer or oligomer having a lower than ambient melting temperature comprises one of an isodecyl methacrylate, a 2-phenoxyethyl acrylate, an isobornyl acrylate, a propylene glycol monomethacrylate, a propylene glycol dimethacrylate, an ethylene glycol dimethacrylate, a 1,6-hexanediol dimethacrylate, a urethane acrylate, or an epoxy acrylate.

20. (original) The method of claim 1, wherein said ultraviolet initiator comprises one of an aromatic ketone or a hydroxyl ketone.

21. (original) The method of claim 20, wherein said ultraviolet initiator comprises one of a, benzyl dimethyl ketal, a benzoin n-butyl ether, a trimethyl benzophenone, a benzophenone, or an alpha hydroxy ketone.

22. (original) The method of claim 1, wherein said phase-change material comprises a polymerizable epoxy functionality; and
said ultraviolet initiator comprises a jettable cationic photoinitiator.

23. (original) The method of claim 22, wherein said jettable cationic photoinitiator comprises a solution of one of a triaryl sulfonium hexafluoroantimonate, a triaryl sulfonium hexafluorophosphate, or diaryl iodonium hexafluorophosphate.

200314101-1

10/701,885

24. (original) The method of claim 1, wherein said ultraviolet initiator comprises a photoinitiator synergist.

25. (original) The method of claim 1, wherein said ultraviolet initiator comprises one of a dye or a colorant.

26. (previously presented) The method of claim 1, wherein said ultraviolet initiator is deposited prior to said each depositing of a bulk amount of phase-change material.

27. (original) The method of claim 1, wherein said phase change material comprises one of a solid or a liquid when deposited.

28. (original) The method of claim 26, wherein said phase change material is a solid when deposited.

29. (original) The method of claim 28, wherein said solid phase change material is a powder or a sheet.

30. (original) The method of claim 29, further comprising heating the solid phase change material to a liquid form either before or after the step of ink-jetting the ultraviolet initiator.

31-79. (cancelled)

200314101-1

10/701,885

80. (currently amended) A method for solid free-form fabrication of a three-dimensional object, comprising:

depositing a layer of phase-change material;

selectively applying an ultraviolet initiator in a predetermined pattern to said phase-change material, wherein said pattern of said ultraviolet initiator defines a cross-section of said three-dimensional object; and

exposing said ultraviolet initiator to an ultraviolet light to cross-link said phase-change material in said predetermined pattern;

wherein said phase-change material, after being deposited, is in a solid phase, said method further comprising liquefying said phase-change material; and

~~The method of claim 68,~~ wherein said phase-change material is applied in a liquid phase and then solidified, said ultraviolet initiator is then applied to said phase-change material, said phase-change material is then re-liquefied and permeated by said ultraviolet initiator.

81. (cancelled)

82. (currently amended) A method for solid free-form fabrication of a three-dimensional object, layer by layer, said method comprising:

for each layer formed,

first selectively ink-jetting an ultraviolet initiator in a pattern that defines a cross-sectional area of said three-dimensional object;

200314101-1

10/701,885

then, depositing a bulk amount of phase-change material in a defined region over said ultraviolet initiator;
exposing said ultraviolet initiator to an ultraviolet light to facilitate cross-linking of said phase-change material; and

~~The method of claim 81, further comprising~~ applying ultrasonic energy to said phase-change material, wherein said ultrasonic energy is configured to facilitate a mixing of said phase-change material and said ultraviolet initiator.